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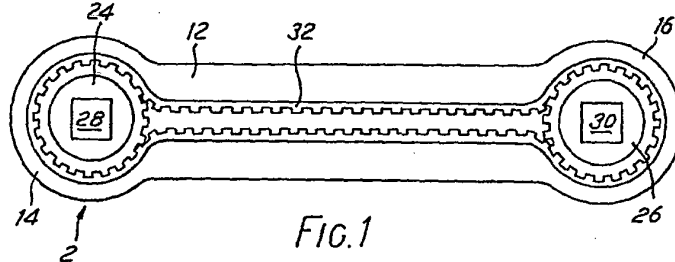
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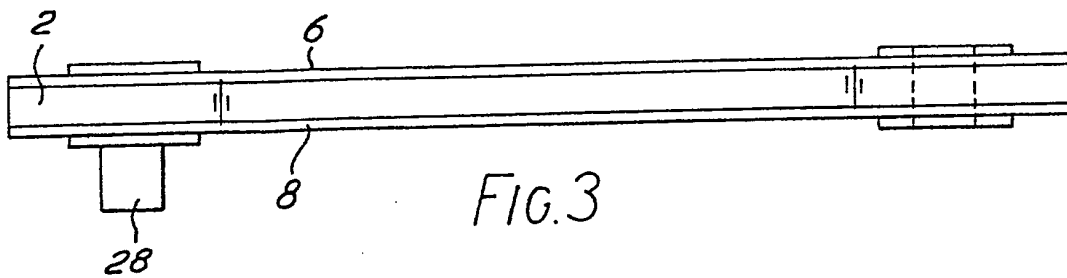
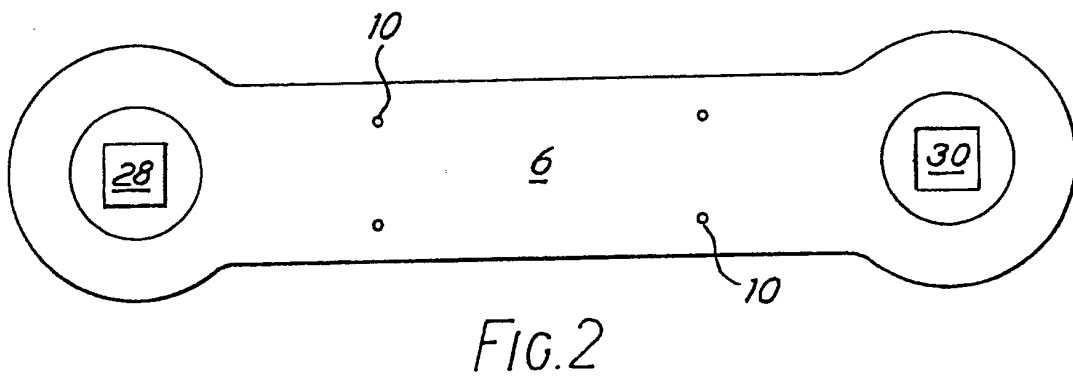
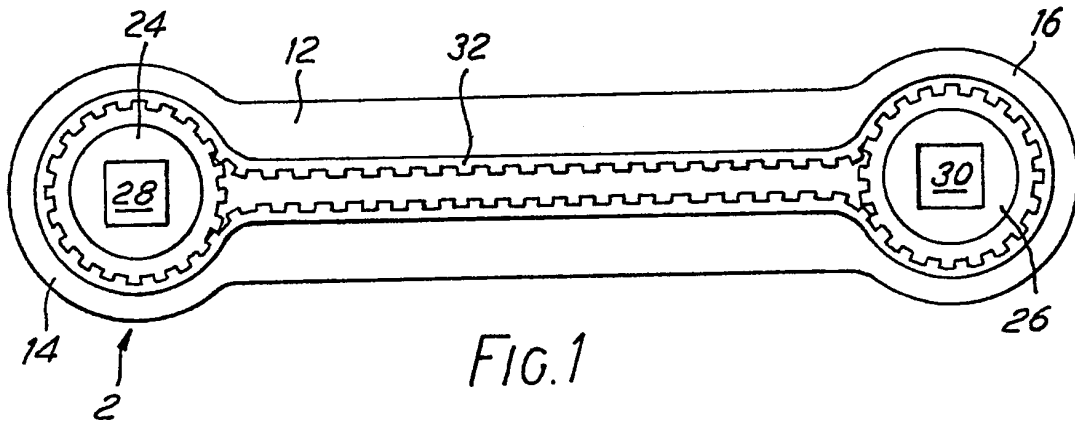
(54) A tool

(57) A tool including a guide member (2) housing a pair of axially-spaced toothed wheels (24 and 26) coupled by a toothed belt (32). The wheel (24) carries a drive member (28) of square cross-section and the wheel (26) defines a socket (30) also of square cross-section. The tool is arranged to be interposed between a torque bar and a socket unit so as to displace the axis of rotation of the torque bar from that of the socket unit in situations where there is limited space for manoeuvring a torque bar.



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## SPECIFICATION

## A tool

5 The present invention relates to tools.

Tool sets such as socket sets are designed for tightening and loosening nuts and bolts. Such sets consist of a torque bar having a head carrying a drive member of square cross-section and a plurality of socket units each arranged to accommodate a nut or bolt head of different size. Each socket unit is generally cylindrical and has at one axial end a recess of square cross-section arranged matingly to engage the square drive member of the torque bar.

15 At its other axial end each socket unit has a recess of hexagonal cross-section arranged to accommodate the head of a bolt or a nut of corresponding size. To fasten the nut or bolt the torque bar with an appropriate socket unit fitted to the drive member and engaging a nut or bolt, is angularly displaced about the axis of the drive member. The drive member can be rigid with the head. With such an arrangement the torque bar must be rotated through 360° several times to fully tighten or loosen a bolt or nut.

On many occasions access to the nut or bolt will be limited and not allow a full 360° rotation of the torque bar. To cope with such problems a ratchet mechanism can be incorporated within the head of the torque bar to couple the drive member to the torque bar. Thus, to fasten or loosen a nut or bolt the bar is made to oscillate through a relatively small angle.

Where room for manoeuvre around a nut or bolt is extremely limited, such as for example in the remoter parts of a motor vehicle engine, there may be insufficient space to permit the minimum range of angular displacement of the torque bar required to work the ratchet mechanism.

On such occasion, specially designed and profiled tools need to be employed.

According to the present invention there is provided a tool comprising a guide member housing, first and second axially-spaced rotary wheels, each said wheel either defining a socket or supporting a drive member, and means coupling said wheels for rotation whereby the application of a torque to one of said wheels will cause the other wheel to rotate in unison therewith.

According to the present invention there is further provided a tool comprising a guide member defining a slot and two enlarged recesses at opposite ends of the slot, a pair of toothed wheels, one located in each said recess and endless coupling means located in said slot and extending from opposite ends of the slot to engage a respective wheel, one said wheel defining a drive member and the other said wheel defining a socket whereby when the wheel defining the socket is driven, a driving force will be communicated to said drive member.

A tool embodying the invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings in which:

Figure 1 is a longitudinal section through the tool;  
Figure 2 is a plan view of the tool; and

Figure 3 is a side elevation of the tool.

The tool to be described is arranged for use in conjunction with a socket set. The purpose of the tool is to distance the axis of rotation of the torque bar from that of a socket unit being used. Thus, the tool will support a socket unit for rotation about a first axis and will support a torque bar for rotation about a second axis extending parallel to, but lying spaced from, the first axis.

As shown in the drawings the tool comprises a central guide member 2 of plastics (for example PERSPEX, Registered Trade Mark) having an elongate central portion 12 and two generally circular end portions 14 and 16.

Each circular end portion 14 and 16 defines a respective circular recess or opening. A slot in the elongate central portion 12 communicates with the two circular openings.

A toothed wheel 24 is accommodated in the opening in the end portion 14. The toothed wheel carries a projecting drive member 28 of square cross-section. Another toothed wheel 26 is accommodated in the opening in the other end portion 16. This wheel has a socket 30 of square cross-section.

An endless belt 32 having teeth on its internal surface, drivingly couples the two toothed wheels 24 and 26. The wheels 24 and 26 and the endless belt 32 are so dimensioned that the belt 32 is held under slight tension against the junctions between the walls of the circular openings in the end portions 14 and 16 and the walls of the slot in the central portion 12.

The belt 32 and the toothed wheels 24 and 26 are held captive in the guide member by a pair of stainless steel cover plates 6 and 8 secured by screws 10 on opposite sides of the guide member 12.

Preferably, the belt is of an elastomeric material reinforced with steel wires to ensure a firm and positive coupling between the two toothed wheels. However, other devices may be employed to provide such a coupling, for example, a flexible (link) chain or rigid drive shaft. The term "belt" is used to describe all such devices.

In operation the tool is used in conjunction with a socket set. An appropriate socket unit is selected and mounted on the drive member 28 and then made to engage a nut or bolt.

The drive member of a torque bar is inserted into the square socket 30 and rotated about the axis of the socket. This rotates the toothed wheel 26 which through the toothed belt 32 causes a corresponding rotation of the toothed wheel 24. The drive displacement is finally communicated to the selected socket unit by the drive member 28 rigid with the wheel 24.

It will be appreciated that the tool acts to displace the axis of rotation for the torque bar away from the axis of rotation of the socket unit and so enables a drive to be transmitted to a nut or bolt in an area with little room for manoeuvre.

To reduce friction between the belt 32 and the guide member 2, the inner face of the guide member 2 is greased. In a modification the belt is impregnated with a lubricant. Alternatively oil holes are provided in the guide to allow oil to be supplied to the contacting surfaces of the belt and guide

member.

While the tool has been described with the toothed wheels having parallel but spaced axes it will be appreciated that the elongate portion 12 of the guide member can be produced with a slight twist so that the axes of the toothed wheels are inclined to one another.

While the belt is held under tension by the wheels 24 and 26 and by virtue of the profile of the slot particularly in the region where it joins the circular openings, the tension can instead be provided by an additional spring biased tensioning roller or member (not shown).

## 15 CLAIMS

1. A tool comprising a guide member housing, first and second axially-spaced rotary wheels, each said wheel either defining a socket or supporting a drive member, and means coupling said wheels for rotation whereby the application of a torque to one of said wheels will cause the other wheel to rotate in unison therewith.
2. A tool according to Claim 1 wherein said wheels are toothed wheels and said coupling means is also toothed with the teeth of the coupling matingly engaging the teeth of the wheel.
3. A tool according to Claim 1 or to Claim 2 wherein said coupling means comprises a belt of elastomeric material reinforced with reinforcing members.
4. A tool according to any preceding claim wherein said guide member is of hard plastics material.
5. A tool according to any preceding claim including a pair of plates secured to the guide member to hold said coupling means and toothed wheels captive in the guide member.
6. A tool comprising a guide member defining a slot and two enlarged recesses at opposite ends of the slot, a pair of toothed wheels, one located in each said recess and endless coupling means located in said slot and extending from opposite ends of the slot to engage a respective wheel, one said wheel defining a drive member and the other said wheel defining a socket whereby when the wheel defining the socket is driven, a driving force will be communicated to said drive member.
7. A tool according to Claim 6 wherein the profile of the slot and the enlarged recesses are such that when the coupling means is engaged by said wheels it is held in said slot under tension.
8. A tool according to Claim 6 including tensioning means for holding said coupling means under tension.
9. A tool according to any preceding claim including lubricating means for lubricating the contacting surfaces of the coupling means and the guide member.

10. A tool substantially as hereinbefore described with reference to the accompanying drawings.

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